



Air Quality in Ohio Farms and Health Risks to Farmers and their Neighbors

Lingying Zhao, Food, Agricultural, and Biological Engineering

Animal production has made a shift toward large-scale and more concentrated operations to meet society's increasing demands. The livestock industry is facing significant hurdles as a result of increasing public concern about odor and gaseous and particulate emissions from animal operations. Some large operations are already experiencing lawsuit challenges—in one recent case, part of a final settlement totaled more than \$50 million. Extensive literature reports have documented acute and chronic respiratory disease and dysfunction among swine and poultry workers—exposure costing millions in medical bills and lost production, and priceless amounts in quality of life.

Concentrated animal feeding operations generate potentially significant levels of aerial pollutants such as ammonia, hydrogen sulfide, methane, carbon dioxide, odor, and dust. Ammonia and hydrogen are harmful to human and animal health. Odor creates a nuisance for neighbors, and dust particles carry odor, bacteria, and viruses that may be transmitters of disease.

Air emissions from animal-feeding operations are affected by many factors, including geographical location, climate and weather conditions, topography, animal species, facilities, farm layout, and management practices. As a result, air emission data from other states or countries are not easily transferable to Ohio. Collection of air quality and emission data is needed from representative Ohio animal farms in order to establish appropriate decision-making tools and to develop effective mitigation technologies for livestock and poultry.

This research project focused on both indoor and outdoor air quality to account for human worker and animal health and air dispersion into neighboring communities. Air quality spatial distribution inside the animal buildings and outdoors along downwind direction were studied over cold, warm, and hot seasons. In addition, the air quality at emission sources, such as exhaust fans of animal buildings, was monitored continuously for a week in each season to assess the emission variation due to animal activity and time of day. Statistical analysis was conducted to determine the effects of management practice, ventilation, weather conditions, facility type, and time of day on air quality and emissions.

OBJECTIVES

The objectives of this project centered on developing methods and protocols to assess air quality and emissions data around animal production farms and conducting a preliminary assessment of exposure levels to aerial pollutants of farm workers and neighbors.

CHALLENGES

Currently, no standard test methods exist for monitoring aerial pollutant emissions and air quality of animal farms. There is also very limited information on air emissions from animal feeding operations and effective mitigation solutions. As animal production facilities shift toward larger scale, more concentrated operations, human and animal health, both on and around the facilities, is becoming an increasing concern. According to the newly announced EPA air quality compliance agreement with animal feeding operations, the livestock and poultry industries are facing a significant challenge to manage the aerial pollutants and comply with the federal air quality laws.

Management practices, while important, must be coupled with the development of mitigation technologies to reduce aerial pollutant emissions to levels specified by federal air quality laws.

ACHIEVEMENTS

Short-term air quality and emission information from six typical Ohio farms—two dairy facilities, one egg-laying facility, and three swine farms—were collected. The air quality and air emission information was used to develop a fact sheet to educate Ohio livestock and poultry producers on the air emission levels of a typical Ohio farm. The fact sheet has proved to be very helpful for producers in making decisions about signing the EPA air quality compliance agreement with animal feeding operations, which was announced January 21, 2005. This agreement is having a profound impact on the livestock and poultry industry.

THE FUTURE

Using the preliminary data from this SEEDS project, a USDA grant in the amount of \$482,499 was secured for a two-year study toward developing mitigation technologies. An additional \$515,150 has been received from an industry partner. Work can now continue on additional collection and analysis of air quality and emissions data specifically tailored to Ohio.

This funding will also allow for the refinement and validation of methods and protocols used to assess air quality and emissions in various types of livestock production facilities. Evaluation of management practices and potential mitigation technologies for air emissions from animal feeding operations will be developed. In addition, design of decision support tools for livestock and poultry industries for use in managing aerial environment and emissions will be developed.



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